

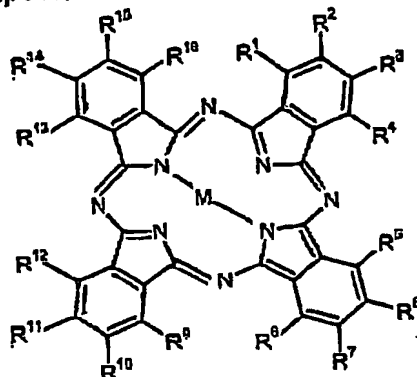
ART 34 AMDT

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CLAIMS - AMENDED

1. A phthalocyanine compound of Formula I



wherein at least the eight groups represented by R^1 , R^4 , R^5 , R^6 , R^8 , R^{12} , R^{13} & R^{16} which groups are identical are -X-J wherein

J is selected from C_{1-8} -alkyl; C_{2-8} -alkenyl; C_{4-8} -cycloalkyl (each being optionally substituted by a group selected from C_{1-4} -alkoxy, C_{1-4} -alkylthio, C_{6-12} -aryl, C_{6-12} -arylthio, C_{1-4} -alkylsulphonyl, C_{1-4} -alkylsulphonylamino, C_{1-4} -alkylsulphoxide, amino, mono- and di- C_{1-4} -alkylamino, halogen, nitro, cyano and hydroxycarbonyl (-COOH), hydroxysulphonyl (-SO₃H) or dihydroxyphosphonyl (-PO₃H₂) or C_{1-4} -alkyl esters thereof) and from C_{6-12} -aryl (optionally substituted by a group selected from C_{1-3} -alkyl, C_{1-3} -alkoxy, C_{1-3} -alkylthio, C_{1-3} -alkylsulphonyl, C_{1-3} -alkylsulphonylamino, C_{1-4} -alkylsulphoxide, amino, mono- and di- C_{1-3} -alkylamino, halogen, nitro, cyano and hydroxycarbonyl, hydroxysulphonyl or dihydroxyphosphonyl, hydroxycarbonyl- C_{1-3} -alkyl, hydroxysulphonyl- C_{1-3} -alkyl, dihydroxyphosphonyl- C_{1-3} -alkyl or C_{1-3} -alkyl esters thereof);

M is an oxymetal group selected from VO, TiO and MoO;

X is S, Se, Te or NT;

T is H, alkyl or phenyl, or T & J, together with the N atom to which they are attached, form an aliphatic or aromatic ring provided this N atom is not positively charged; provided where J is aryl, T is not aryl;

and the remaining groups from R^1 to R^{16} are independently selected from H, halogen, -OJ, hydroxycarbonyl, hydroxysulphonyl, dihydroxyphosphonyl, hydroxycarbonyl- C_{1-3} -alkyl, hydroxysulphonyl- C_{1-3} -alkyl and dihydroxyphosphonyl- C_{1-3} -alkyl, provided that at least one of R^2 and R^3 , at least one of R^6 and R^7 , at least one of R^{10} and R^{11} and at least one of R^{14} and R^{15} is hydrogen, with the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc.

2. A phthalocyanine compound according to Claim 1 wherein each of R^2 , R^3 , R^6 , R^7 , R^{10} , R^{11} , R^{14} & R^{15} is H.

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3. A phthalocyanine compound according to any one preceding Claim wherein the compound has an electronic absorption peak from 750 to 1100 nm, more preferably from 800 to 1000 nm.

5 4. A phthalocyanine compound according to Claim 3 wherein the compound has at least 90%, preferably at least 95%, of its absorption strength in the region above 400nm at or above 750 nm.

10 5. A phthalocyanine compound according to Claim 3 or 4 wherein the electronic absorption peak has a band width at half peak height in solution of less than 60 nm.

15 6. A phthalocyanine compound according to any one preceding Claim wherein J is selected from C₃₋₆-alkyl, which may be straight or branched chain; C₂₄-alkenyl; cyclohexyl; phenyl; naphtha-1-yl or naphtha-2-yl, each of which is optionally substituted as defined in claim 1.

7. A phthalocyanine compound according to Claim 6 wherein J is phenyl, optionally substituted as defined in claim 1.

20 8. A phthalocyanine compound according to Claim 6 or 7 wherein the substituent(s) for the phenyl; naphtha-1-yl or naphtha-2-yl groups represented by J is(are) independently selected from C₁₋₂-alkyl; C₁₋₂-alkoxy; C₁₋₂-alkylthio; C₁₋₂-alkylsulphonyl; C₁₋₂-alkylsulphoxide; amino; mono- and di-C₁₋₂-alkylamino; halogen; nitro; cyano; hydroxycarbonyl, hydroxysulphonyl, dihydroxy-phosphonyl, hydroxycarbonyl-C₁₋₃-alkyl, 25 hydroxysulphonyl-C₁₋₃-alkyl and dihydroxy-phosphonyl-C₁₋₃-alkyl and C₁₋₂-alkyl esters thereof.

30 9. A phthalocyanine compound according to any one of claims 6 to 8 wherein the optionally substituted phenyl; naphtha-1-yl or naphtha-2-yl groups represented by J are selected from phenyl, 4-methylphenyl, 2-methylphenyl, 4-1-propylphenyl, 2,4-dimethylphenyl, 2,5-dimethylphenyl, 3,5-dimethylphenyl, 4-methoxyphenyl, 4-methylthiophenyl, 3-(2-[methoxycarbonyl]ethyl)phenyl, 3-(hydroxycarbonyl)phenyl, 4-(hydroxysulphonyl)-phenyl, 2-chlorophenyl, 4-bromophenyl, 3,5-dichlorophenyl, naphtha-1-yl and naphtha-2-yl.

35 10. A phthalocyanine compound according to any one of the preceding claims wherein the compound has a formula:

octa-3,6-(RX)-Pc-M

Formula III

wherein

40 M is an oxymetal group selected from VO, TiO and MoO;

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Pc is the phthalocyanine nucleus;

X is S, Se, Te or NT wherein T is H, C₁₋₄-alkyl or phenyl; and

R is phenyl or naphthyl each of which is optionally substituted by up to 5 groups selected from C₁₋₃-alkyl, C₁₋₃-alkoxy, C₁₋₃-alkylthio, C₁₋₃-alkylsulphonyl, C₁₋₃-alkylsulphonyl-amino, C₁₋₃-alkylsulphoxide, amino, mono- and di-C₁₋₃-alkylamino, halogen, nitro, cyano and hydroxycarbonyl, hydroxy-sulphonyl, dihydroxyphosphonyl, hydroxycarbonyl-C₁₋₃-alkyl, hydroxysulphonyl-C₁₋₃-alkyl or hydroxyphosphonyl-C₁₋₃-alkyl or C₁₋₃-alkyl esters thereof; or

R & T together form a piperidinyl, piperazinyl, morpholinyl or pyrrolinyl ring.

11. A phthalocyanine compound according to any one of the preceding claims wherein X is sulphur.

12. A phthalocyanine compound according to any one preceding Claim wherein each of R¹, R⁴, R⁵, R⁸, R⁹, R¹², R¹³ & R¹⁶ is 4-methylphenylthio and each of R², R³, R⁶, R⁷, R¹⁰, R¹¹, R¹⁴ & R¹⁵ is H.

13. A phthalocyanine compound according to any one preceding Claim wherein M is VO.

14. A method for the production of a lithographic printing plate containing a photosensitive layer comprising irradiating the photosensitive layer with an infra-red laser in accordance with pattern information wherein the photosensitive layer comprises a compound of formula I in claim 1 without the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc.

15. A method of polymer welding in which a polymer material is irradiated with infra-red laser in a region where it is desired to form a weld wherein the polymer material comprises a compound of formula I in claim 1 without the proviso that the compound is not, octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc, or wherein the polymer material is coated or printed with the compound where it is desired to form a weld, or wherein the compound is provided in a layer or film which is located adjacent the polymer material where it is desired to form a weld.

16. A method for the protection of an interior of a glazed structure against the heating effect of incident IR radiation by incorporating into the glazing or a layer forming part of the glazing a compound of formula I in claim 1 without the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc.

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17. A method for the attenuation of IR irradiation passing through a protective film by incorporating into the protective film or a layer forming part of the protective film an compound of formula I in claim 1 without the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc.

18. A method for detecting an article carrying a superficial image by scanning with an infra-red detector wherein the image comprises a compound of formula I in claim 1 without the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc.

19. A method for the formation of a permanent toner image on a substrate using an electrophotographic device incorporating an IR source to fix the temporary toner image on the substrate and/or provide an IR-readable permanent toner image wherein the toner comprises a compound of formula I in claim 1 without the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc.

20. An article carrying an image adapted for machine reading in response to a reflective signal generated by scanning the image with infra-red radiation wherein the image comprises a compound of formula I in claim 1 without the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc.

21. A method for the enhancement of a thermal signal comprising incorporating into or onto the article from which the thermal signal is derived a compound of formula I in claim 1 without the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc.

22. An ink comprising a compound of formula I in claim 1 without the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc.

23. An ink according to Claim 22 also comprising a colorant.

24. An ink according to Claim 22 or Claim 23 also comprising an alkoxyated or polyalkoxyated acrylate monomer and a photoinitiator.

25. Use of compounds of formula I in claim 1 but without the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc as a security marker.

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26. A method of establishing the authenticity of an article or substrate comprising marking the article or substrate with a mark including a compound according to formula I in claim 1 without the proviso that the compound is not octa-3,6-(phenylthio)VOPc, octa-3,6-(methylthio)TiOPc or octa-3,6-(ethylthio)VOPc and detecting and/or measuring a characteristic absorption of infrared radiation by the mark.

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